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WINTER 2012-2013 OUTLOOK

WHAT FACTORS WILL PLAY A ROLE THIS WINTER?

Introduction

- What are the primary factors that will influence our weather patterns this upcoming winter season?
  - ENSO: ENSO Neutral conditions in the tropical Pacific
  - PDO: Negative Pacific Decadal Oscillation
  - NAO/AO: North Atlantic Oscillation/Arctic Oscillation

- Initial Winter Outlook from the CPC and our closing thoughts on the upcoming winter

What is ENSO?

- ENSO – Stands for El Niño Southern Oscillation.

  → Is a periodic ocean-atmosphere fluctuation in sea surface temperatures (SSTs) and air pressure in the tropical Pacific that has an interannual period of 3-7 years.

  → 3 different phases of ENSO

  1. Neutral
  2. El Niño
  3. La Niña

What is ENSO?

- Neutral
  - Climatologically Normal conditions.
  - Warm water in west and cool waters in the east.
    - Due to trade winds blowing to west
  - Low atmospheric pressure in west and high in east.

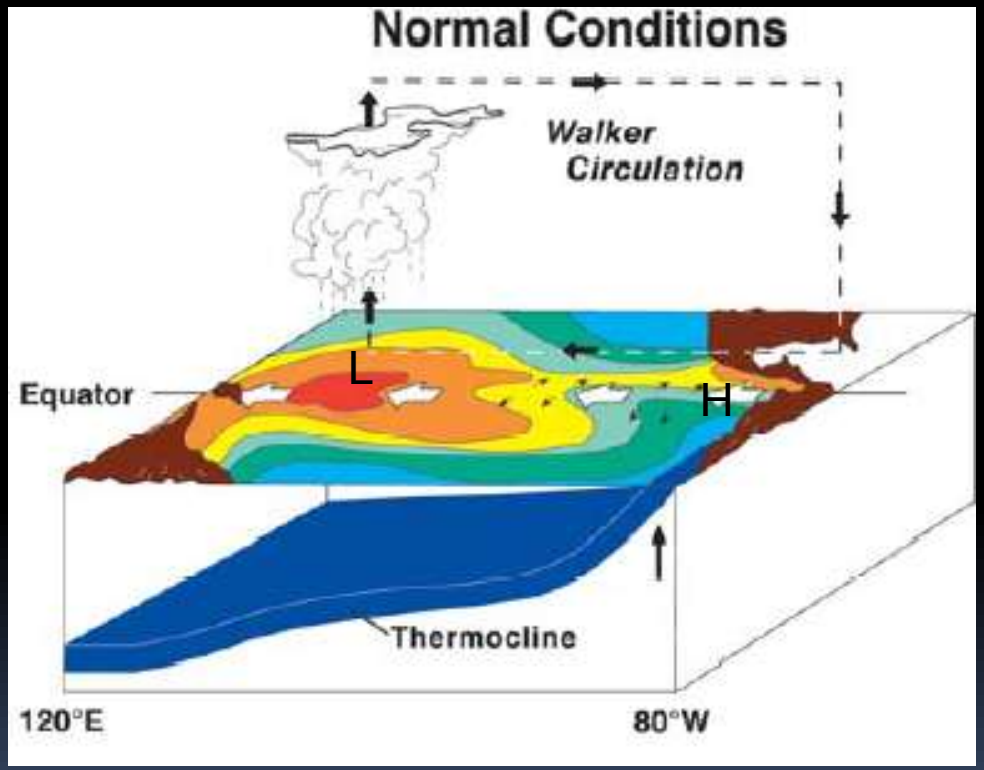


Figure reproduced from McPhaden 2004

What is ENSO?

- **El Niño**
  - Warm phase of ENSO.
  - Warmer than normal eastern tropical Pacific Sea Surface Temperatures (SSTs).
    - Due to typical trade winds slowing down or even reversing
  - Lower atmospheric pressure in central and eastern tropical Pacific.
  - Higher atmospheric pressure in the west.

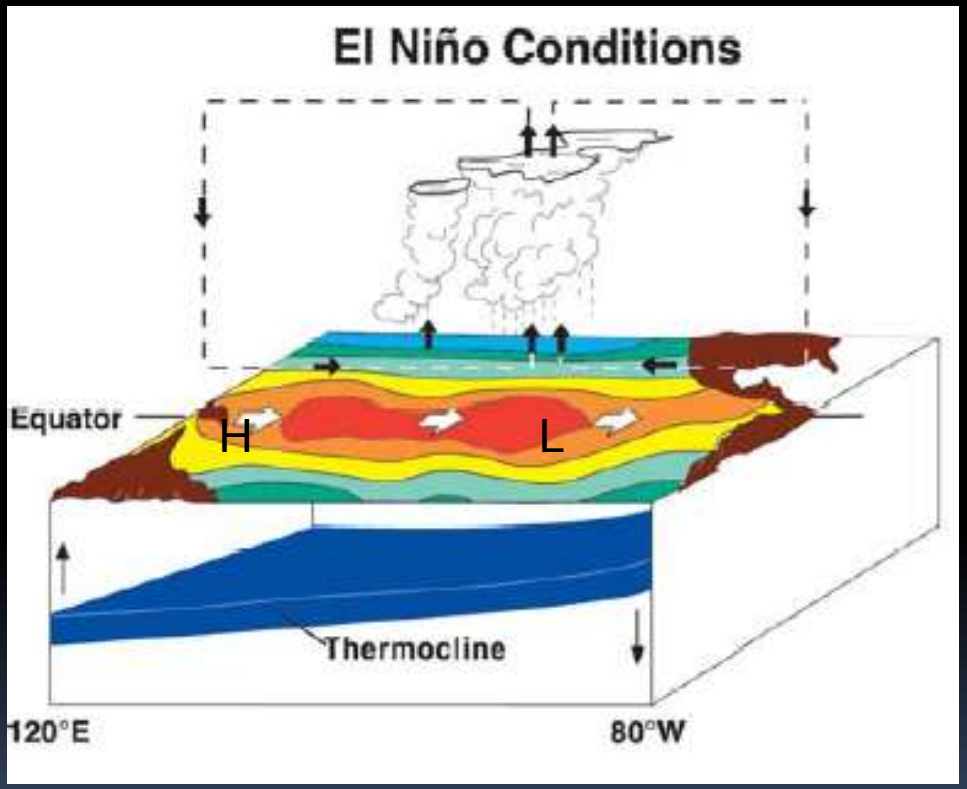


Figure reproduced from McPhaden 2004

What is ENSO?

- La Niña
  - Cool phase of ENSO.
  - Cooler than normal central and eastern tropical Pacific SSTs.
    - Due to stronger than normal trade winds toward west and upwelling
  - Lower atmospheric pressure in extreme west.
  - Higher atmospheric pressure in east.

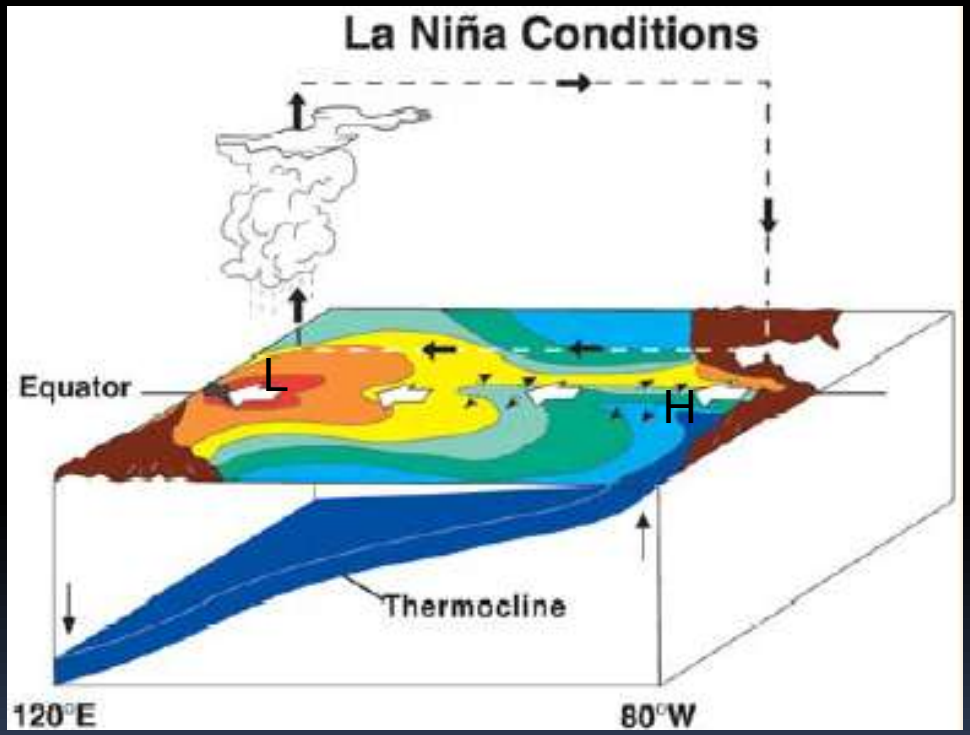
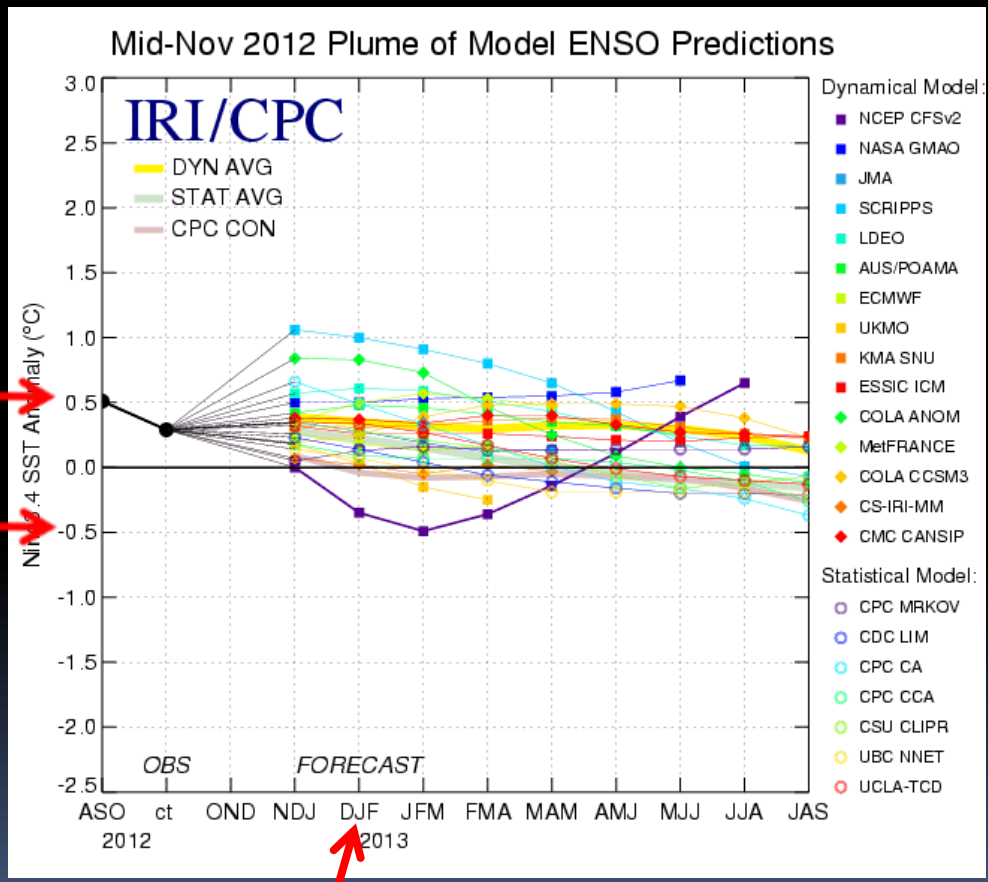


Figure reproduced from McPhaden 2004

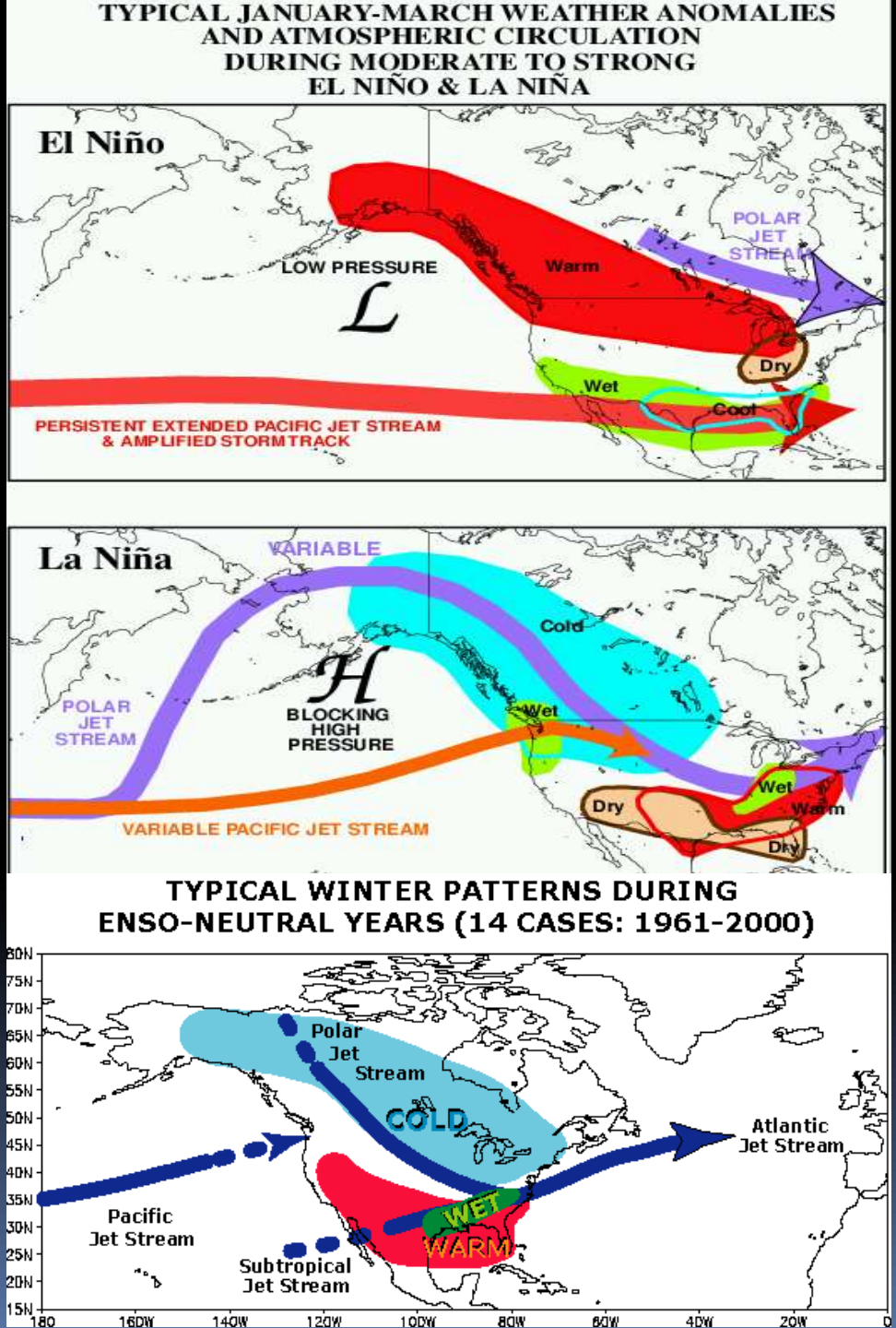
ENSO Neutral Conditions in Place

A majority of the statistical and dynamical modes predict that ENSO Neutral conditions will continue through the winter season (-0.5° to +0.5°).

ENSO Neutral is between (-0.5° to +0.5° on the scale)



Three month period (DJF) is December, January and February.



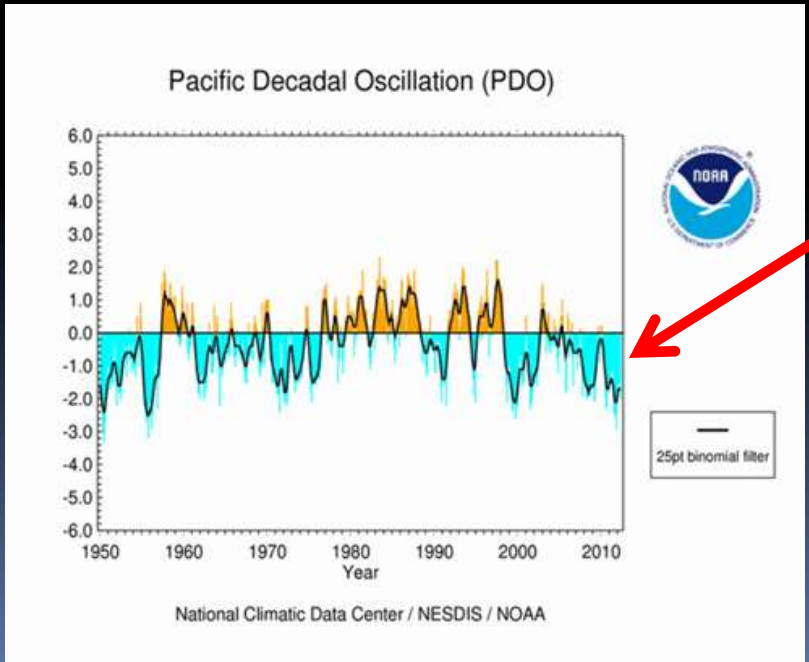
Typical winter season Storm track (jet stream) across North America during each ENSO phase:

- La Nina and ENSO neutral events show similar patterns, with the tendency of Blocking High Pressure across the North Pacific
  - -> This acts to buckle the jet stream southward across western Canada and the northern Portion of the United States.
  - -> Colder conditions are favored across the northern U.S. and warmer conditions are favored across the south.
  - -> Above average precipitation is favored across portions of the Tennessee and lower Ohio valleys.

What is the PDO?

- PDO – Stands for the Pacific Decadal Oscillation.

→ Is an ENSO-like oscillation of water temperatures that occurs over a 15 to 25 year and a 50-70 year time period within the northern Pacific Ocean basin.



We are currently in the negative phase of the PDO

- There are two phases of PDO, these are:
  1. +PDO → is the warm phase of the PDO and is characterized by cold western and central north Pacific waters and warm eastern Pacific Ocean waters (similar to a prolonged El Nino event in the North Pacific).
  2. -PDO → is the cool phase of PDO and is characterized by warm western and central north Pacific waters and cool eastern Pacific Ocean waters (similar to a prolonged La Nina event in the North Pacific).

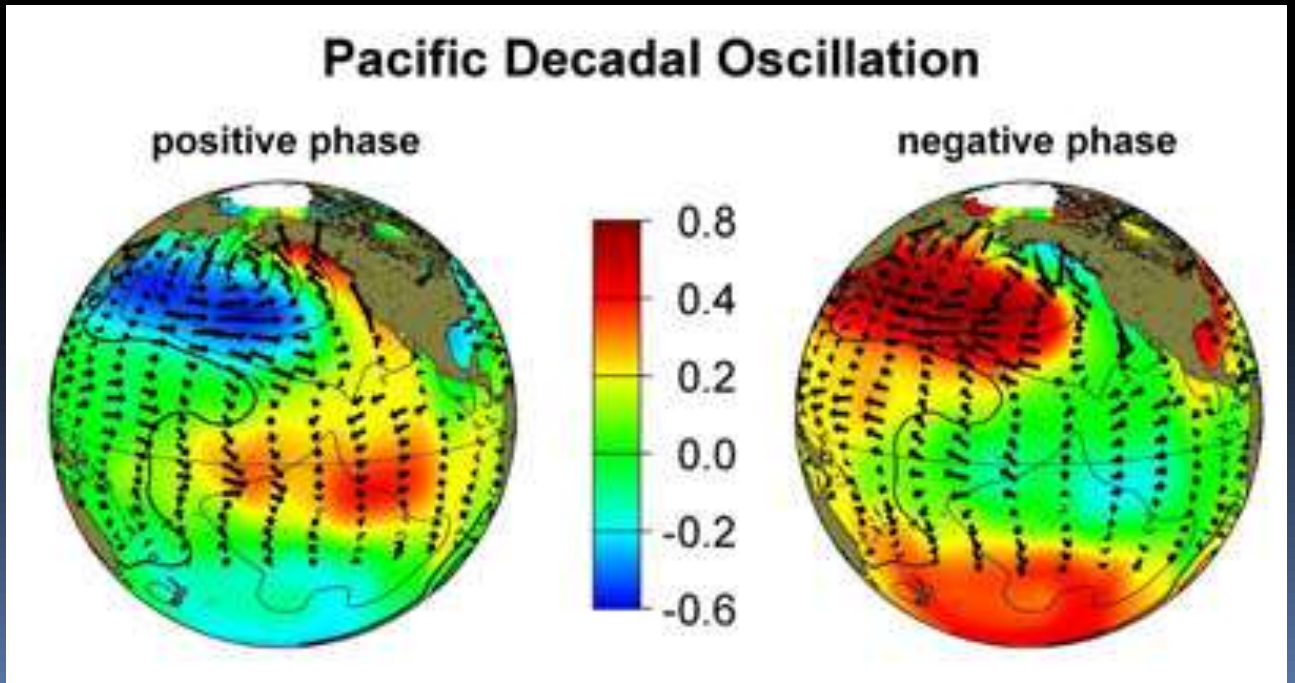
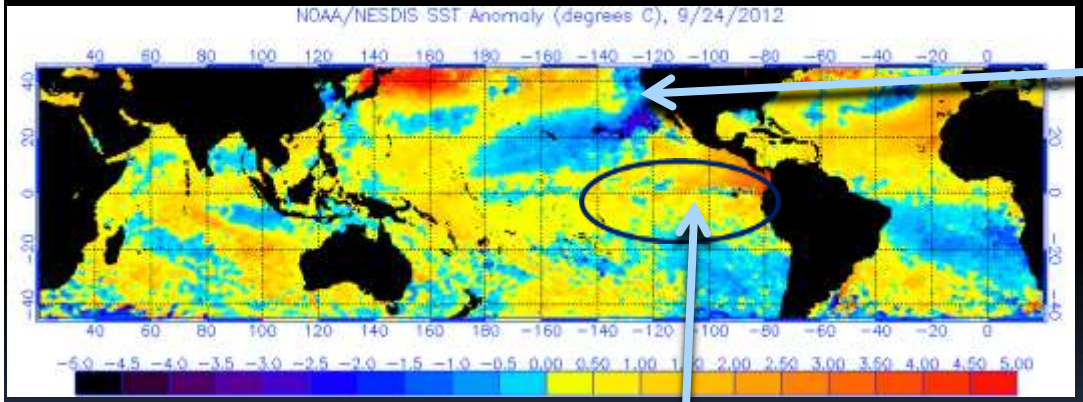


Figure reproduced from: http://tao.atmos.washington.edu/pdo/

- In General, Constructive interference occurs when ENSO events are in phase with the PDO.
- El Niño events → stronger impact during the +PDO.
- La Niña events → stronger impact during the -PDO.

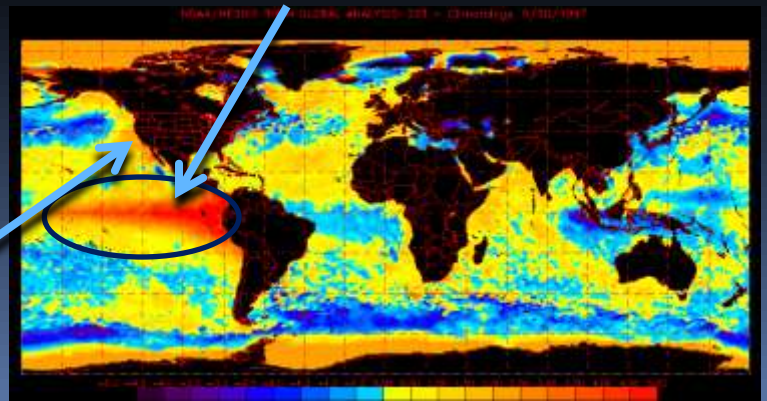
- These stronger events tend to have a greater influence on local climate parameters.



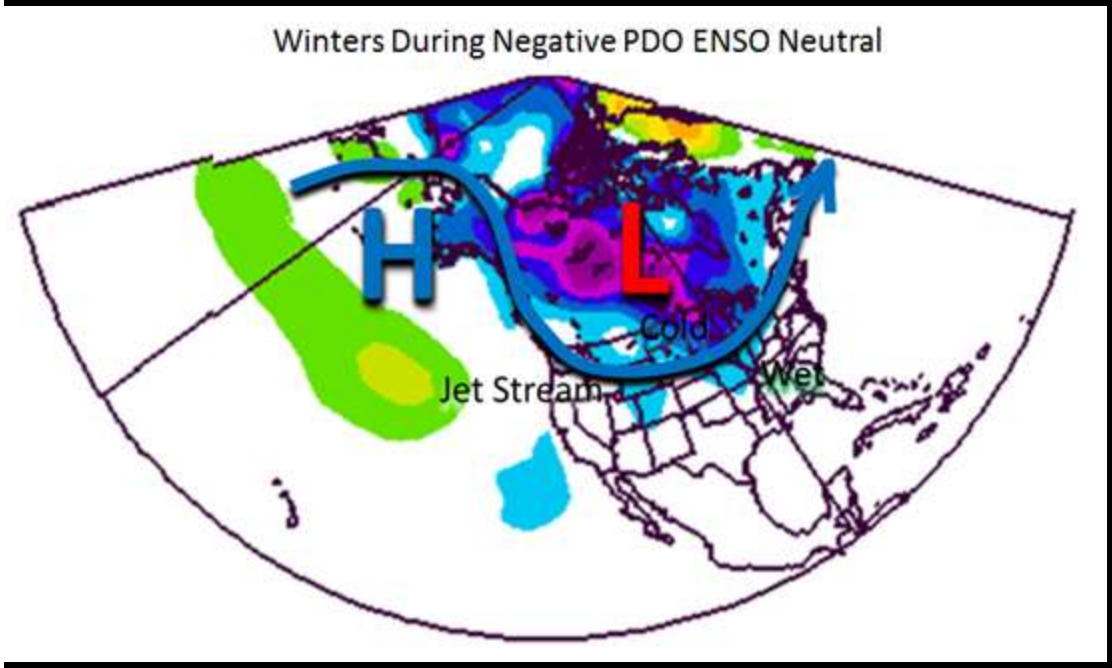
Negative PDO signal

Near Normal Sea Surface Temperatures (ENSO Neutral)

September 1997 Record El Nino event

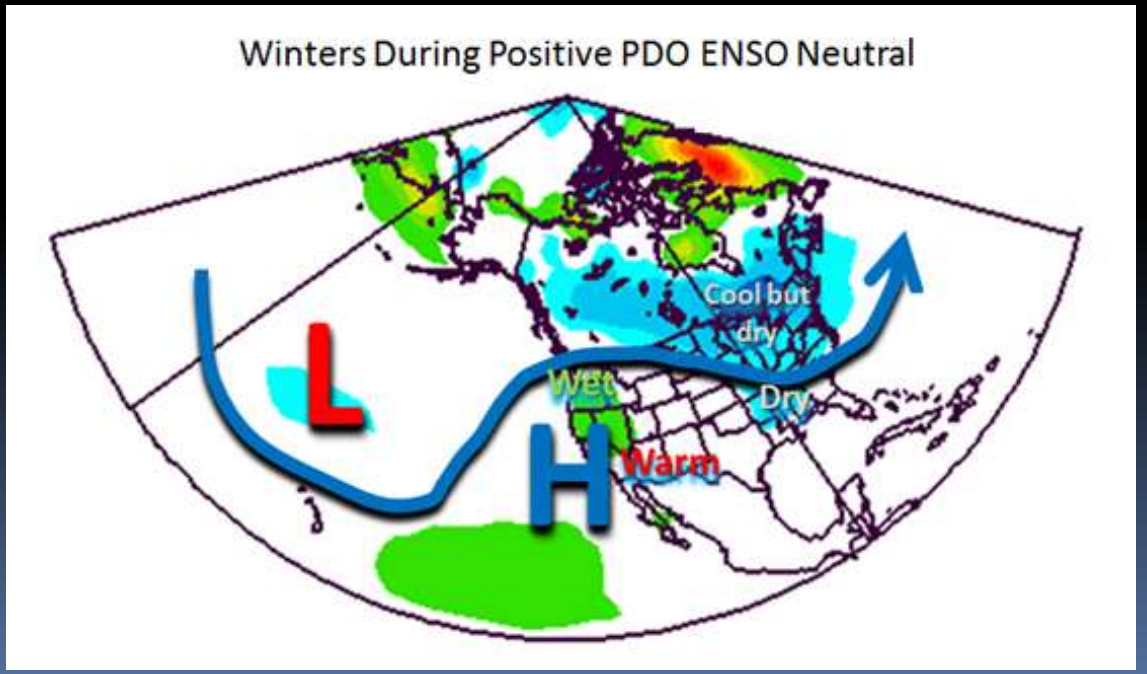


Positive PDO signal



- Tendency for more persistent North Pacific Blocking High pressure
- The winter season storm track tends to be driven southward across the northern CONUS.
- Above average precipitation is favored across the lower Ohio and Tennessee valleys.
- Below normal temperatures, with more arctic outbreaks, are favored across the northern CONUS.

- Tendency for low pressure across the Pacific and high pressure across the western CONUS.
- This drives a weaker storm track across the central CONUS.
- Below average precipitation is favored across the lower Ohio and Tennessee valleys.
- Slightly cooler than normal temperatures are favored across the northern CONUS.

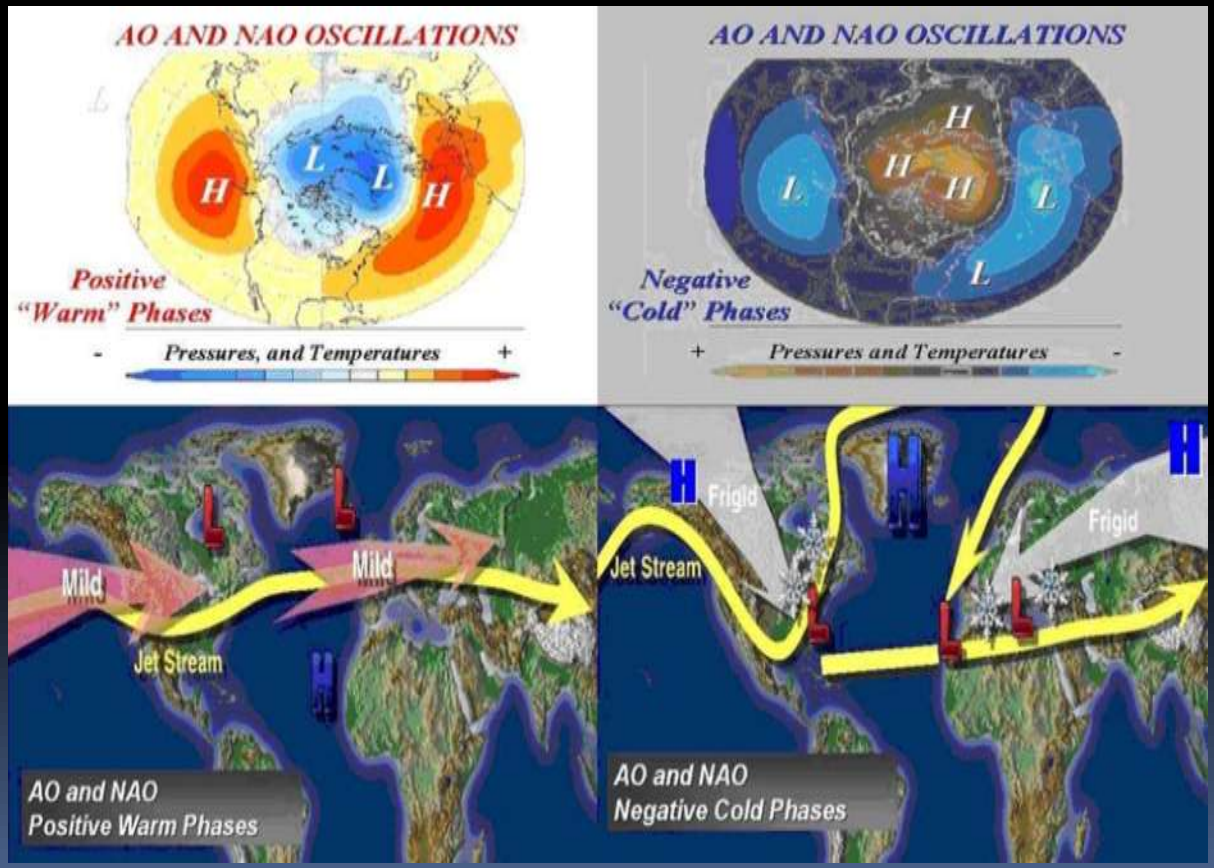


The North Atlantic Oscillation and Arctic Oscillation (NAO/AO)

- Is a wild card this winter.
  - Could prove to be the difference between a mild or colder winter.
    - → Is a north to south dipole pattern of atmospheric pressure anomalies of opposite sign across the North Atlantic and Arctic.
    - → Has periods of variability ranging from intraseasonal to interdecadal.
    - → Highly unpredictable more than a few weeks out.

The North Atlantic Oscillation and Arctic Oscillation (NAO/AO)

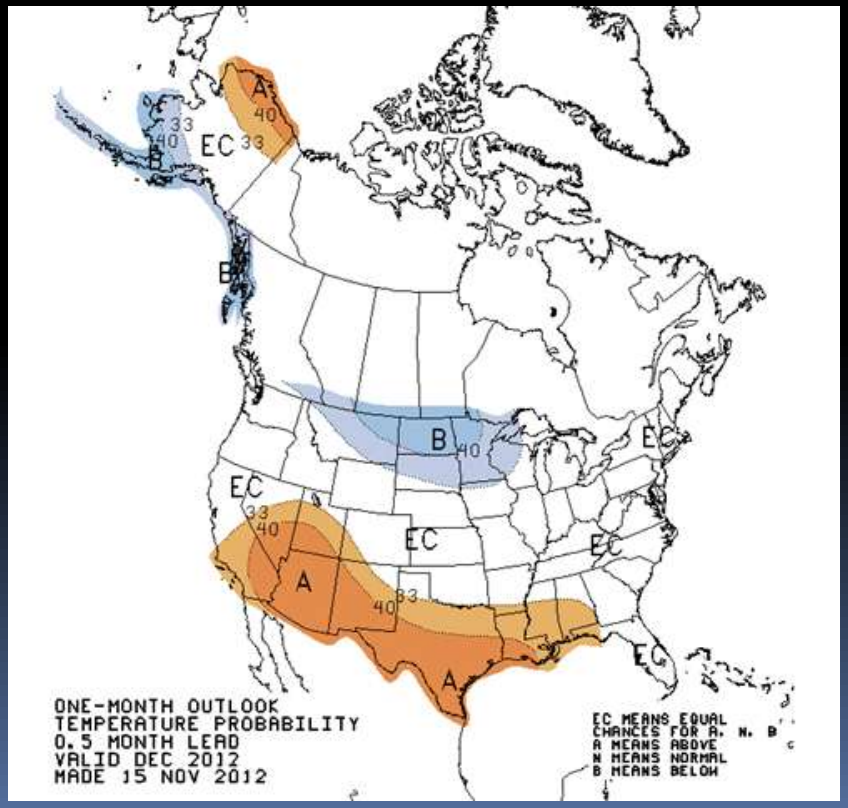
- Consists of the positive and the negative phases shown in the image below.



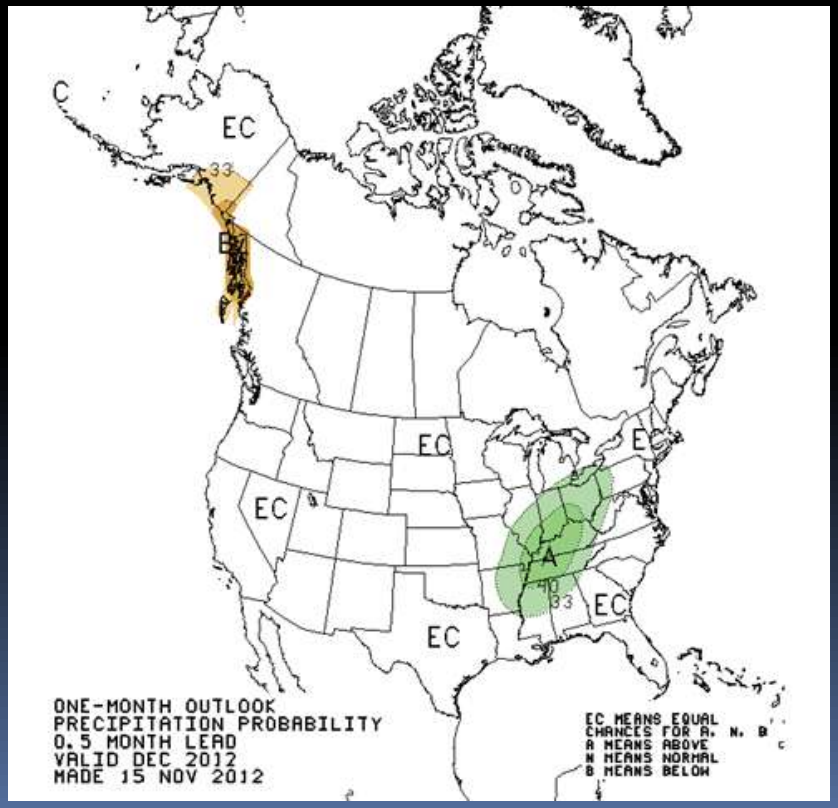
- Negative phase favors more arctic outbreaks with colder than normal conditions and more snowfall across the eastern half of the country.
- Positive phase favors warmer and drier conditions across the eastern half of the country.

Climate Prediction Center December 2012 Outlook

Temperature forecast for northern Illinois is for equal chances of above, below or near normal.

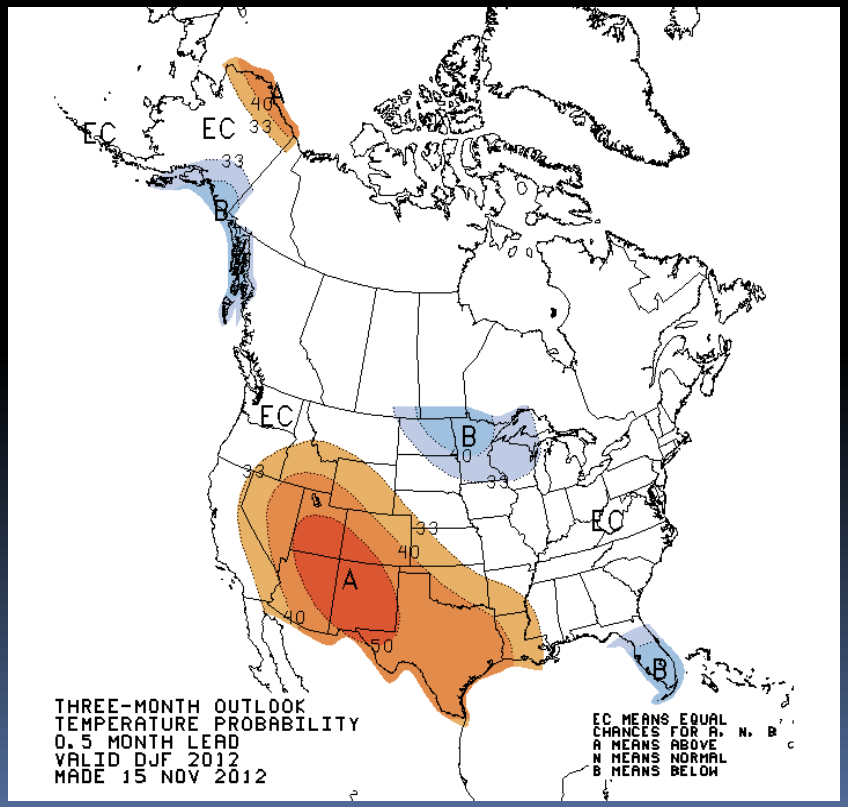


Precipitation forecast for portions of Illinois and most of Indiana is for enhanced chances of being above normal.

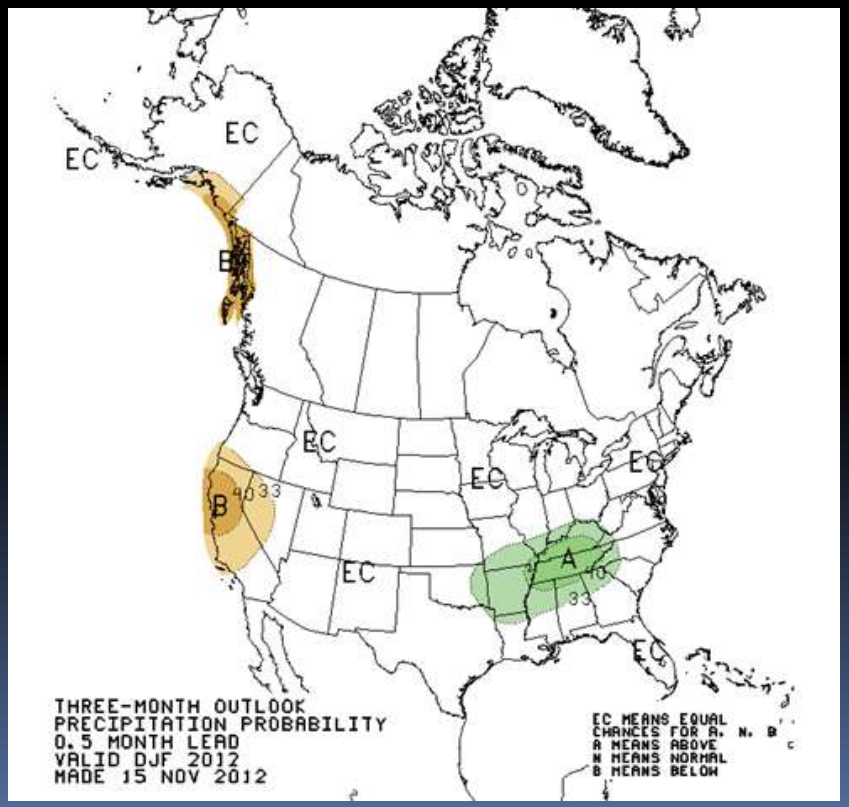


Climate Prediction Center Winter 2012-13 Outlook

Temperature forecast for northern Illinois is for equal chances of above, below or near normal.



Precipitation forecast for portions of Illinois is for equal chances of above, below or near normal.



Summary

Overall Winter 2012-13 Outlook

- ENSO Neutral conditions with a negative PDO expected this winter.
  - Should influence the weather patterns this winter.
  - This could favor near average to above average snowfall and near average or slightly below average temperatures.
- Biggest wild card → likely the exact behavior of the NAO/AO:
  - If the NAO/AO becomes negative and remains mainly negative this could increase our chances of being colder than normal, as occurred in the winters of '09-'10 and '10-'11.
  - A predominantly positive NAO/AO would increase our chances of being warmer than average, as occurred in winter '11-'12.
  - *There are signs (see in-depth outlook for more info) that at least the first week of December may exhibit strong North Pacific Blocking indicative of the –PDO and a –NAO/-AO, which could get meteorological winter off to a colder than normal start.*
  - *STAY TUNED!*

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